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ABSTRACT

In an effort to stimulate and assist higher education administrators to think and do something about the erosion of buildings taking place on many campuses, this publication serves as a basic overview of the problem. Rising energy costs, continuing inflation, and worsening financial conditions in general only compound the situation that has been estimated to amount to as much as a $35 billion accumulated maintenance deficit. A framework for carrying out the survey of deferred maintenance work is provided and survey guidelines include an example of a maintenance survey organized by class of work and subdivided into priorities. Items to be considered in developing an appropriate presentation for funding deferred maintenance are discussed. The role of the facilities manager is defined. It includes responsibilities involved in identifying goals, establishing an organization to execute work, and adopting policies and procedures to assure a program with a strong sense of accountability. The appendices contain guidelines for evaluating facilities management, examples from three institutions of facility reviews that show work needed and estimated costs, and an analytical approach often used to determine whether a facility should be renovated or replaced. (Author/MLF)

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MORTGAGING THE FUTURE:
The Cost of Deferring Maintenance

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PREFACE

The text for this publication is drawn from a presentation by Dr. Harvey H. Kaiser, Vice President for Facilities Administration, Syracuse University, at a 1978 workshop conducted by the Association of Physical Plant Administrators of Universities and Colleges (APPA). It was subsequently delivered at the annual meeting of the Eastern Regional Association of APPA later that year.

It serves as a basic overview of the problem. An extensive review of the contents has not been made. Nor is there general agreement on the various definitions presented. The magnitude of the problem has been sufficiently proved but not statistically documented. The procedures and forms for analysis and presentation of the problem have yet to be properly refined.

The primary purpose of the document is to stimulate and assist higher education administrators to begin thinking and doing something about the slow but increasingly evident erosion of the educational environment that is taking place on many of our campuses.

It is anticipated that this will be but the first of many forthcoming projects and activities that will address the deferred maintenance issue and examine possible solutions. A comprehensive program is being developed through the joint efforts of APPA, the National Association of College and University Business Officers, the American Council on Education, and the Association of Governing Boards. These education associations serving colleges and universities solicit your comments and support.

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FOREWORD

Reports in recent years on the fiscal health of higher education point to worsening financial conditions caused by using up of capital and deferring of maintenance and replacements. The lack of accumulated reserves to correct problems of repair or replacement of obsolete facilities is at the core of the problem.

In some cases, unrealistic growth projections placed heavy emphasis on adding new facilities while older structures were neglected. In others, adequate resources to cover operating budgets compensated for weak management practices. The conditions of rapid growth in the 1950's and 1960's followed by the withdrawal of national resources to higher education are a prelude to the effects of projected dwindling enrollments in the 1980's.

A Federal study made in 1976 of institutions in higher education which failed, identified the main causes of failure as confusion and conflict regarding purpose, mission and/or value orientation, insufficient financial base or administration or management lack of expertise. It is incumbent on all of us to assure to the best of our ability that our particular institutions do not suffer from these shortcomings or to correct the situation where it exists if at all possible.

One of the most responsive sources for improving fiscal stability of institutions is in the management of facilities. Facilities management is a broad term referring to responsibilities for the physical resources of an institution. A requisite for efficient use of financial resources on existing facilities is that a "maintainable" condition exists. If a level of deterioration has occurred that is irreversible then the much more costly prospect of replacement is necessary. The issue of deferred maintenance has connotations of mismanagement which can discourage responsible action. The only reasonable course of action to follow is to confront the situation and develop a program to reduce deferred maintenance into a program for incorporation into annual budget terms.

This publication is intended to provide an overview to the issue of deferred maintenance. It is a problem which deserves immediate and responsible attention.

I. INTRODUCTION

The subject of deferred maintenance is frequently enough discussed that most physical plant managers have a fairly good grasp of what it is. They can often tell you the difference between preventative maintenance, scheduled maintenance, and deferred maintenance. There even probably exists in most managers' files a list of projects already to put into action, if.... That if is usually attributed to the lack of funds allocated to building repairs, or the last minute withdrawal of funds for maintenance projects requested year after year.

The situation now exists nationally on a large enough scale to have caught the attention of several levels of interest. Definite action has been taken on several campuses to identify the deferred maintenance needs. Funds have been allocated and programs to overcome deteriorating facilities exist in the University of Nebraska, Syracuse University, University of Maryland and University of Tennessee systems. At another level, several national organizations representing interests of higher education have joined forces to coordinate activities related to deferred maintenance. During the past year, the Association of Physical Plant Administrators (APPA), the National Association of College and University Business Officers (NACUBO), Association of Governing Boards (AGB) and the American Council on Education (ACE) have formed a national committee including representatives of industry to develop programs to aid higher education in solving the problem of deferred maintenance.

Finally, the states and national government have begun to address the fiscal needs implied by the backlog of maintenance which is beyond the reach of annual budgeting at the institutional level. The States of Nebraska and Maryland have passed enabling legislation for comprehensive maintenance programs. The Federal Departments of HEW, HUD and Energy each are either now funding or proposing legislation to aid in maintenance needs in either a direct manner or indirectly through assisting in energy conservation or improving facility accessibility for the handicapped.

However, the scope of the problem on a national scale has only been recently addressed by a preliminary survey of the joint committee of the national higher education associations. It was estimated that as much as $35 billion may now be needed nationwide to offset the cost of maintenance that colleges have put off since the campus building boom of the 1960's. According to one estimate, perhaps $15 billion of the total would be required just to cover the backlog of projects to bring facilities up to government standards and to take care of essential energy-related repairs.

Defining the problem at the national level is of value in gaining the attention of higher education to this critical issue. It is the goal of the committee of the national organizations to persuade the chief executive officers and governing boards in

higher education and federal and state agencies that facility maintenance is the highest agenda item for future business. However, if the need is not related to the individual campus, then the problem will remain as it has been viewed in the past: the facilities manager will have a list of projects ready to go, but other priorities will push maintenance requests aside.

The purpose of this discussion is to turn this situation around. It has been done elsewhere. In order to do this:

First, we must understand what is deferred maintenance;
Second, we must measure it;
Third, we must effectively present the case for funding, and
Fourth, we must be prepared to manage the overall maintenance program.

Defining deferred maintenance is an exercise which often distracts from the more fundamental task of attacking the problem itself. Because of the implication that deferral has been caused by neglect and not conscious planning administrators shy away from approaching the main job. There is general agreement in standard texts and professional association on the definition of maintenance as allocation of resources required to restore facilities as close as practicable to original constructed conditions until useful life requires replacement. Thus, a regular or controlled maintenance program are the resources expended in a scheduled manner to prevent excessive deterioration.

The difficulty in reaching a definition which is operable is illustrated by the concept proposed by a committee of the Association of Physical Plant Administrators. (1978):

"Deferred Maintenance. The labor and materials expended in the periodic restoration of facilities that are deteriorating on time cycles of greater than one year. The concept of deferred maintenance derives primarily from the budgeting practices of the institution wherein maintenance funds are allocated either on an annual, biannual or triannual basis, but without cash reserves being established for the restoration of facilities with maintenance life cycles of greater than one budget cycle (usually one year). For example, a roof which has a useful life of twenty-five years and now in its fifteenth year may be considered to have accumulated a partial deferred maintenance expense of 15/25ths of its restoration cost. When the roof is twenty-five years old (and at the expiration of its useful life) a deferred maintenance of the entire replacement cost must be provided to restore the roof to its new useful life."

However, the definition of deferred maintenance adopted in the State of Nebraska Legislation provides a workable model which will be followed in the present discussion (Legislative Bill 309, 1977):

"Deferred maintenance shall mean any measures taken to correct structural or mechanical defects that would endanger the integrity of a building or its components or allow unwanted penetration of the building by the outdoor elements, or measures taken to correct a waste of energy, including minor repairs, alteration and maintenance painting, cost of materials, hiring of building maintenance personnel, and other necessary expenses for the maintenance of roofs, exterior walls, retaining walls, foundations, flooring, ceilings, partitions, doors, building hardware, windows, plaster, structural ironwork, screens, plumbing, heating and air conditioning equipment, or electrical systems, but excluding decorative finish or furnishing, building additions, or installation of additional summer-winter air conditioning."

The technical aspects of what maintenance programs are about are 90 percent of the problem. The remaining 10 percent is the presentation of the material in a convincing enough manner to obtain the highest agenda priority for funding. Interestingly enough, the programs of deferred maintenance referred to earlier were started independently. Surveying those underway resulted in the conclusion that little reliance was placed on experience elsewhere. Approaches were tailored most appropriately to the local conditions.

At Nebraska, the University prepared a survey in early 1976 which showed a backlog of work of $21 million. Although it felt its needs unique to the University, a survey of State facilities by a Nebraska legislative committee showed a backlog of deferred statewide maintenance of almost $40 million. At Syracuse an original program of deferred maintenance in 1970 identified $18 million of backlogged work. The magnitude may be similar at other campuses but lack of accurate data on a localized basis prevents a national overview.

Those institutions and state agencies which initiated deferred maintenance surveys came to realize that programs of building maintenance called regular, scheduled or preventative (or similar titles), had to be developed as part of a comprehensive approach to maintaining facilities. In order to justify requests for adequate maintenance funding for deferred work, facility maintenance programs had to be organized to prevent further deterioration after deferred work was completed. In turn, the surveys showed that organizational structure, policies and procedures, and program management were essential components of a comprehensive program. The prevention of future deferring of work, with concomitant increased costs of repairs or for the construction of entirely new replacement facilities, broadened deferred maintenance programs into comprehensive institutional facilities management programs. At Nebraska the causes of a backlog of deferred

repair resulted in a comparison of previously budgeted maintenance funds with maintenance fund requirements based on the replacement cost of facilities. The solution to deferred maintenance resulted in the State acknowledging the deficiencies and appropriating funds to reduce the backlog. At the same time, efforts were expended to develop appropriate fundable scheduled preventative maintenance programs.

Thus, we find that while the basic need of deferred maintenance requires attention to existing facility conditions, simultaneous efforts are necessary to coordinate overall facilities management. The discussion of deferred maintenance must take place within the context of a program which takes into view the specific nature of an institution; how its staff is organized; how funds are allocated; how needs are determined and how programs are managed. We will be discussing in greater detail later some approaches to maintenance organization, policies and procedures, facilities evaluation and program management. First, however, I would like to briefly outline the components of a facilities management program.

Facilities Management Program

The program of facilities management developed at Syracuse University provides a guide for a comprehensive approach to maintenance planning. Begun in 1970 as a series of measures to conserve the University's facilities, the program has been broadened to provide effective management of facilities. At the start of the period the University Board of Trustees agreed to borrow almost $9 million to correct deferred maintenance needs. Since then, minor changes have been made in organizational structure and program goals.

The ten major features of a facilities management program are:

1. Physical Planning Policy. A series of policy statements concerning land area, building usage, circulation and parking, and decision-making about physical facilities prepared for review and approval by the senior administration and supervising Board. The policies revised the over-optimistic projections of growth made in the early 1960's and developed projections for real estate and building space to 1985. Conclusions were made about consolidation of University land holdings and buildings into a more compact area. Specific recommendations were made to eliminate marginal buildings and for a capital funding to fully renovate seven major academic buildings, and repay the borrowed $9 million for deferred maintenance. A controlled and planned maintenance program which included

preventative maintenance was deemed vital to the program of facilities conservation. The overall plan was prepared by administrative staff in a two-month period and computer based planned maintenance program was completed in about one and one-half years.

2. Inventory of Space and Facilities. Previously prepared inventories of University space and facilities were put together annually by manual techniques. Planning purposes and timely, consistent and accurate reports for government agencies indicated more sophisticated methods should be sought. Finally, a system of space identification is essential to supporting fiscal control necessary to achieve productivity increases. A survey was made of the requirements for development of a new space inventory system and the availability of management information systems on the market. A system developed by the Massachusetts Institute of Technology called INSITE was found to be available and met Syracuse's needs. The system was put in place in a three-month period and inventories approximately 6,000,000 gross square feet of 33,000 spaces in 450 buildings used for academic, administrative, residential and other purposes. It is staffed by one person and has proven quite valuable in major policy decisions on University space and facilities.

3. Survey of Deferred Maintenance and Major Rehabilitation. During the 1950's and 1960's major expansion occurred at Syracuse University in enrollment and facilities. At the same time that new buildings were being added to the campus major maintenance work was deferred on existing buildings. The 40 major academic buildings and 40 major and minor residence halls built from the University's founding in 1870 were surveyed in detail for maintenance needs. A professional staff of the facilities planning office evaluated general construction, building systems for HVAC and electrical, site work, utilities and building functional appropriateness. Conclusions contained in this extensive survey were an updating of the Physical Planning Policy and have been refined in greater detail for separate programs of deferred maintenance and major building renovation. The original building surveys have proved to be valuable in selecting priorities for future facility evaluations.

4. Deferred Maintenance. A five-year program to correct maintenance work which had previously been deferred

was begun in 1970. The program was funded by $9 million borrowed for the purpose. The commitment was made with the understanding that seven major academic buildings required extensive rehabilitation and would be funded separately, but that by 1975 the University would be maintaining facilities with a regular maintenance program. Under the deferred maintenance program building exteriors were restored with new roofs, masonry repairs, and repaired window openings. Roads and walks were rebuilt and the residual of areas not touched by earlier building clearance or new construction were improved. Building interiors were given some attention but improvements to building systems were given higher priority than cosmetic appearances. In some cases detailed inspections required project revisions or shifting of priorities to address new conditions. Incomplete or newly discovered conditions, have provided part of the "backlog" in the regular maintenance program.

5. Major Rehabilitation. A survey of seven major academic buildings showed that their value as assets should be retained and their life extended from 50 to 75 years by major renovations. This meant complete gutting to exterior walls for one, replacement of all building systems for all and improvements to comply with current occupancy and safety codes. A series of individual building feasibility studies showed that an increase of about 20 percent in space could be achieved through renovation. The proposals were based on cost-effective measures which included consolidation of academic programs and the subsequent elimination of marginal space, and potential staff reductions by eliminating repetition of personnel housed in several locations. During the period of fund-raising minimal levels of maintenance would be provided. Two buildings have been declared national historic landmarks and a proposal to include other buildings in a historic district has been prepared. Detailed feasibility studies are prepared by outside consultants and reviewed by University staff.

6. Increased Space Utilization. The allocation of space and its utilization in higher education tend to be done on a decentralized basis with registrars or similar offices acting as clearing houses to avoid conflicts. The basic question to be asked in maintenance planning is what would be the effect of eliminating a facility on the institutions' overall academic functions. The usage of space must be determined in order to establish criteria for further decisions. Such decisions affect operating costs for utilities, maintenance,

custodial general services and support staff. For example, two administrative staffs located in adjacent buildings were reduced in size. They were then brought together in one underutilized space. During the process, savings were realized by being able to reduce energy needs in the now occasionally occupied space; support staff duplication because of two locations was reduced; support services such as mail, security and custodial needs are reallocated, and at least one coffee pot discarded.

Major savings were achieved at Syracuse University by evaluating space which was marginally useable at the completion of construction or in disuse because of changes in programs. National interest has been focused on this concept in recent years as recycling, preservation, facility conservation or restoration. Under whichever title, the concept requires a fresh view of all space and concentration on those used seldom or never. For example, the use of dining spaces for multiple purposes is common as is the encroachment in public circulation areas for office space. More imaginative uses are the conversion of a barn to a housing recreation center, use of a factory for studio space and research "surge" space, conversion of a snack bar to administrative space for an entire college, and the creation of an art gallery from an unused dining hall. These steps are part of efforts to consolidate facilities and are a prerequisite for reduction of plant size.

7. Consolidation of Facilities. Construction of new facilities for higher education in the post war period met needs for expanded enrollment and replacement of obsolete buildings. The task of reusing older buildings, often of historical significance to the continuity of the institution, were given little attention. Occasional restorations were performed but older academic buildings and structures acquired to accommodate the rapid post war expansion were given a coat of paint and retained in use. A vivid example of this are World War II housing in one and two-story buildings still in use on college campuses after thirty-five years.

This situation was faced at Syracuse University in the preparation of its Physical Planning Policy and deferred maintenance program. Eight years after this policy decision was reached there has been a reduction of almost one million square feet of space

from an original inventory of over seven million. By defining the University's geographic "limits of interest" decisions could be made to divest properties remote from the main campus. A policy was also established to either improve or demolish structures which had deteriorated and presented potential financial exposure for deferred maintenance.

Consolidation of facilities and increased utilization often operate simultaneously and in the thickest atmosphere of internal campus politics. However, the gains which can be achieved are significant. In some cases capital expenditures are necessary for improvements, demolitions and utility relocations. Additional costs are incurred for moving of equipment, phones and materials. The sequence of operations involved in consolidation and increased utilization often represents a collection of dominoes requiring months and even years to align themselves.

Consolidation of facilities are also being considered in planning for major building renovations. Each project examines current levels of activity and existing locations and attempts to increase utilization in remodeled structures. Vacated space is reviewed for reuse, divestment or demolition. In each case of consolidation of activities maintenance planning has entered into the analysis to determine where operating costs could be lowered, and more effective use of facilities be achieved.

8. Controlled Maintenance Program. Selecting priorities is probably the most difficult task in evaluating maintenance needs under conditions of steady-state or expansion. Under conditions of decline the task is irrational without a system of controlled maintenance. Without a controlled program, decisions between which personnel to reduce, what services to curtail and what level of material purchases to maintain, are made under crisis conditions.

An evaluation of the maintenance program at Syracuse in 1972 showed weaknesses which had a profound effect upon the effectiveness of the maintenance operation in terms of both service and cost. Major weaknesses were:

a. Lack of recognition of the two major types of maintenance activity - i.e., service calls and definable projects - in the design and application of the planning and control concepts.

b. Lack of sufficient detail and follow-through in translating the broad concepts into operating concepts.

c. Inadequate development and documentation of operating procedures.

d. Inadequate training of the people who are working with the system.

Correction of these weaknesses has realized an increase in productivity of approximately 20-25 percent. The goal is 30 percent with an optimum of 65 percent of the hourly workers' daily time directly engaged on maintenance tasks.

Although controlled maintenance is described in standard texts in the field there is little guidance on the job necessary to convert a crisis or response oriented unit into a group acting under regular and planned procedures. The assignment is challenging because of staffs and management in place. Eager for improvement and the opportunity to increase productivity, the only catalyst necessary may be a limited amount of consultant time to aid in identifying objectives and recommending appropriate procedures. The institutional staff is the greatest source of knowledge on plant needs and must be part of developing a controlled maintenance program. It is a waste of time and money to purchase a consultant's effort without the guidance to apply it, and unless there is cooperation of the resident staff in the development of the program. In any context the preparation and implementation of a controlled maintenance program must be results-oriented. The potential achievements for increased productivity is an important part of comprehensive planning.

9. Energy Conservation. An element of maintenance planning which has been recently raised to high priority is energy conservation. It is not uncommon to find colleges and universities

with increases of two to three times in utility bills over 1973. Along with the inflation in the national economy the soaring costs of energy have greatly contributed to the introduction of maintenance planning. Syracuse University has worked hard at the development of a total energy plan--combining preventive maintenance, awareness campaigns, daily operations of physical plant maintenance, an energy management team in the facilities planning office, and selective capital improvement projects. Overall the total energy plan is to make the basic system for the use of energy more efficient, and to realize savings without experiencing curtailment of services.

Most of the conservation activities undertaken at Syracuse, while somewhat ambitious, are not beyond the reach of anyone responsible for the efficient use of energy in the operation of buildings. Basic activities followed those of the Energy Task Force, a joint effort of the Association of Physical Plant Administrators (APPA), National Association of College and University Business Officers (NACUBO), and the American Council on Education (ACE). Typical measures have been reducing number of air changes, lowering lighting levels, closing off portions of steam loops in summer, additions of clock thermostats, adding insulation and storm windows. The increased utilization of space and consolidation of facilities have received justification for cost-effectiveness based on anticipated energy savings. A major innovation is the joint development with county government of a resource recovery station for producing steam from burning solid wastes. The University operates a plant and distribution system for a district of institutions and public housing, consuming about forty-five percent of production for internal purposes. The proposed plant is to be owned and operated by the County. The project will provide a guaranteed source of energy at a predetermined rate on a long-term basis, and free a large amount of natural gas for other local users.

Energy conservation is closely integrated with all the measures described above. It is part of the comprehensive program necessary for maintenance planning. Like other elements of the program at Syracuse, it is based almost entirely on common sense and realistic acceptance of the fundamental issues of awareness, efficiency, action and results.

10. Barrier Free Environment. A program introduced into the overall concept of facilities management is the improvement of access to higher-education by the handicapped and elderly. Although not normally a part of maintenance planning, proposals to eliminate architectural barriers for the handicapped can be evaluated as maintenance decisions are made. Improvements which can be performed as opportunities arise in the course of normal maintenance activities should not be overlooked for the potential of improving access. Building conditions, topography and climate vary widely as influences on attitudes towards elimination of barriers. However, as planning policy, deferred maintenance, major alterations or additions to plant are developed, consideration for improvement of access should be kept as a high priority.

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II. MEASURING DEFERRED MAINTENANCE

Basic Guidelines

Facilities management is a comprehensive approach to allocating institutional resources. Thus, the measuring of deferred maintenance is a component of an institutional program for maintaining physical resources. As such, it provides the opportunity to create an overview of all resources of an institution. The process of measurement should not be overlooked as providing the essential basis of a regular program of inspection for programming and budgeting all maintenance work.

Maintenance programs and how deferred work comes about are typified by often repeated comments. Their repetition suggests that they become explanations for program inadequacy or even are self-fulfilling prophecies. By presenting them here we can further dismiss them from the remainder of the discussion.

- Preventive maintenance programs as they now exist are reactions to trouble calls rather than scheduled maintenance accomplished before deterioration takes place or trouble calls are received.

- Three types of maintenance policies exist.

  The first type is "No Maintenance". One just lets things run down until they are unusable. This concept saves total maintenance costs but will require replacements in the form of new construction.

  The second type is "Haphazard Maintenance". In this type the owner fixes things as they breakdown or fail. The efforts and resources are spent on correcting emergencies. The cost of this maintenance is heavy but less than the new construction replacement costs demanded under the "No Maintenance" policy.

  The third type is "Planned Maintenance". In this type necessary inspections and small repairs are made on a planned schedule. Resources are not needed for emergency repairs and structures do not need to be replaced. This maintenance is much less costly than the "Haphazard Maintenance" policy.

The underlying truth of neglected or irresponsible approaches to maintenance is blunted by arguments about the adequacy of funding and to negative responses to requests for maintenance funds. This does not, nor should not justify the postponing of the initiating of a deferred maintenance program with the first step the measurement of existing conditions. Experience in developing surveys of deferred maintenance requirements shows that this can become a piecemeal approach if not treated as a part of a comprehensive program.

It quickly becomes apparent that without adequate funding for a regular maintenance program the necessary scheduled repairs and inspections become postponed for emergency work. Furthermore without the organization, policies and procedures, and maintenance program management one-time infusion of funds for deferred work will be repeated again. Three program components are necessary to overcome deferred maintenance from reoccurring.

1. Regular maintenance
2. Major rehabilitation
3. Deferred maintenance

As shown in figure 1, all three components are integrated over time in a comprehensive program.

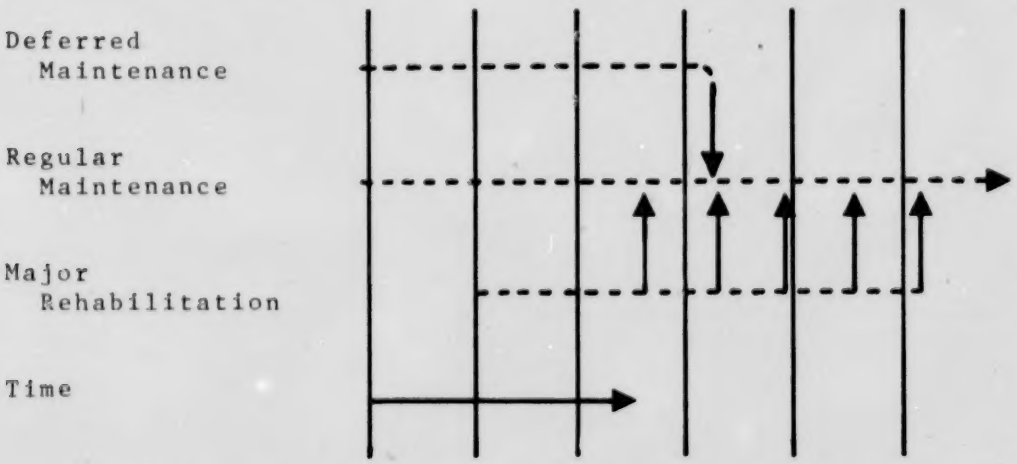


Figure 1.
Comprehensive Maintenance Program

The purpose of a regular maintenance program is straightforward enough: to maintain the integrity, appearance, safety, functional operation, and character of buildings, utility systems, mechanical equipment, roads, life support systems and ancillary functional units within an institution.

The purpose of deferred maintenance can also be succinctly described: measures taken to correct structural or mechanical defects that would endanger the integrity of a building or its components.

Major rehabilitation is a category which comes about because of the overall scope of deferred work. The magnitude of repairs will require decisions about retention or replacement of a facility.

The three components should be brought underway simultaneously. Survey work of all facility needs is not unique and can be performed in a variety of ways; what is essential is that the planning for the three categories go on concurrently with funding requirements and program management dovetailed. It is a misconception that funding for deferred maintenance will result in prompt correction of problem items. Although it might appear that deferred work can be brought about immediately as repairs are made to roofs, windows, walk , roads and readily accessible items, the preparation of adequate specifications, selection of contractors and supervision of work requires some lead time. However, decisions about priority of work and the coordination of work on specific facility components requires broader decisions about the overall condition of a facility, and finally determinations about the future disposition of a facility.

A false start on a deferred maintenance program can be fatal for future funding requests. By selecting priorities incorrectly or ignoring overall campus goals work can be brought underway in a manner which is destructive to the future credibility of facilities management. Stories abound about interiors being repaired before roofs are restored to suitable conditions, or building systems converted on facilities which are obsolete for their current functions. Other institutional demands created by pressures for faculty and staff salaries or student tuition and fees will provide little tolerance for false starts on maintenance programs.

The development and implementation of a comprehensive program for maintenance can take from three to five years. The critical time periods are:

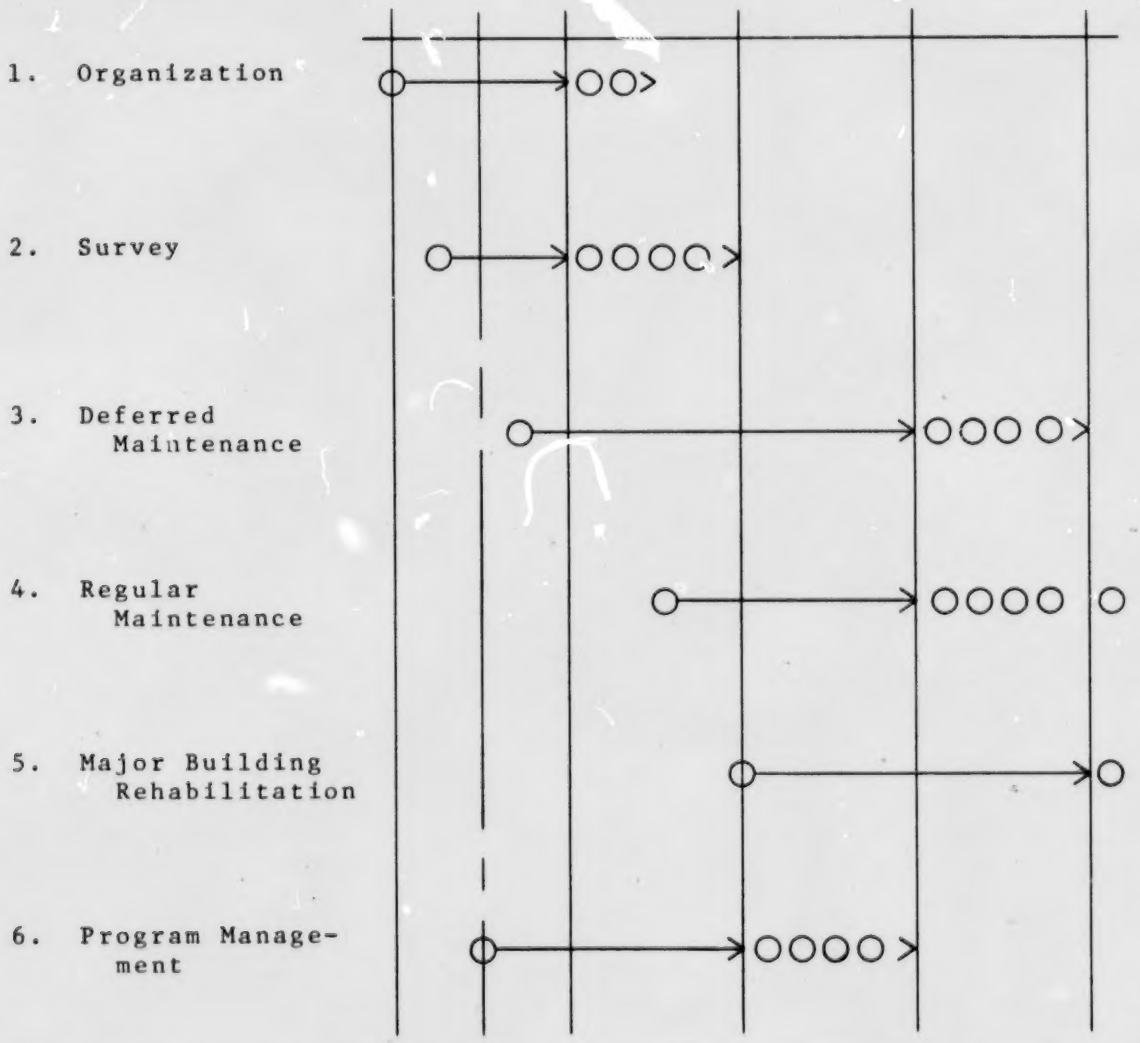


Figure 2.

A Comprehensive Facilities Management Program

Organizing the Work

In case studies of deferred maintenance programs the funding source was presented with a similar proposition. The solution to deferred maintenance required that deficiencies be recognized and that appropriate funds be allocated to reduce the backlog and fund scheduled preventive maintenance programs. This is oversimplified but occurred where organizations responsible for facility management presented thoroughly prepared funding requests.

In organizing the deferred maintenance program an organizational period of about twelve months is used to evaluate existing staff capabilities. Where necessary, staff reorganization occurs and determinations about the engagement of consultants can be made. An instrument for evaluating the facilities management developed from the University of California is included in Appendix A. During the period of organizational evaluation existing data on building conditions, including drawings, specifications and previous building history of maintenance or other rehabilitation work should be assembled.

A framework for carrying out the survey of deferred maintenance work and determination of priorities is important for effective organization. The University of Nebraska guiding legislation provides a good example of a maintenance survey. It is organized by class of work and subdivided into priorities.

Class I - "items for immediate action to provide safety and protection against costly damage." LB 309, Sec. 6.

Priority #1 - Elimination of potential cause of injury or death.

Priority #2 - Elimination of any other condition which, if not immediately corrected, might lead to costly physical damage or deterioration of State property.

A. Under this priority, the possible damage to structure and parts of structures which are of historical value to the State of Nebraska should be considered as well as the possibility of the destruction of irreplaceable portions of such structures.

B. Inclusion in this priority would also require an analysis of occupancy, whether (1) constant, as a hospital, (2) average, as an office, (3) occasional, such as a classroom or (4) infrequent, such as a storage area. Also to be considered would be the monetary or historical value of stored items as well as the susceptibility to damage.

Priority #3 - Elimination of conditions which lead to a waste of energy.

Class II - "items of imperative need to correct problems that if neglected will quickly deteriorate further into Class I items that must be done to provide efficient use of the facility," LB 309, Sec. 6

Priority #1 - Correction of deficiencies which indicate that if those problems are neglected for any additional length of time, the condition will deteriorate into a Class I situation.

Priority #2 - Correction of deficiencies which indicate that if those problems are neglected for one year, the condition will deteriorate into Class I situations.

Priority #3 - Correction of deficiencies which indicate that if those problems are neglected two or more years, the condition will deteriorate into Class I situations.

Priority #4 - Correction of conditions relative to the conservation of energy.

Class III - "additional items necessary to fully renew the facility or system" LB 309, Sec. 6.

All other conditions required to fully renew the facility or system.

At Syracuse University a similar system was used to allocate funds into five categories.

1. Health and Safety
2. Protection of building exteriors
3. Energy Conservation
4. Building Systems
5. Esthetic improvements.

In the review of organizational steps for deferred maintenance two items seem to interpose themselves inappropriately into the planning. They are functional building modifications and esthetics improvements. Changes to building interiors to adapt to revisions in academic or administrative programs can find a ready source for funding by being placed in the deferred work category. Although sometimes necessary for internal campus purposes (or politics) this diluting of deferred maintenance funds will only later injure the credibility of a proposed program, similarly with esthetic improvements which are not related to deferred work.

A component to be built into the organizational phase of maintenance program development is the recognition of "steady-state" operations. Funding for deferred maintenance and major rehabilitation work will provide temporary infusion of monies for a period of up to five years. The size, structure and technical capabilities of staff should be tailored with this in mind. Basic decisions on staffing should be considered depending upon the institution's size, relationship to a multi-campus system, and long-range building programs. This includes the use of consultants and contractors in general.

Survey Guidelines

It has been clearly shown that although inadequate preventive maintenance is costly, there is some point in the maintenance of buildings which could be termed the breaking point between adequate and excessive. Excessive preventive maintenance would certainly provide for excessive cost to an institution and this type of maintenance would be inadvisable, of course.

It would seem feasible that a brick wall could be maintained in perfect condition for years, thereby removing the possibility of deterioration in any form. It would be possible to keep this brick wall in this condition, spending thousands of dollars on tuckpointing and repair, and at the end of a certain number of years demolish the building because it has no further use. It would also be possible that a building such as this could be maintained with a high degree of proficiency and suddenly determine the building has become obsolete for the intended use on a particular campus.

In this particular case, the high degree of efficiency would have been more or less wasted to the institution. It is necessary that in addition to the maintenance needs of a structure, three other qualifications should be considered: possible life from a structural and building systems viewpoint; possible life from a utilization viewpoint due to enrollment or other factors; and possible life due to functional obsolescence.

Facility performance is a concept of importance in developing building surveys. If a facility cannot change and adapt to social and technological pressures the building must be modified or destroyed. The facility performance level curve is a relationship of the ideal optimum performance (same constant) with the actual performance capability. As the environment changes with time, the performance level will decrease to some minimum acceptable

level. At this point in time the facility must either be renovated or abandoned.

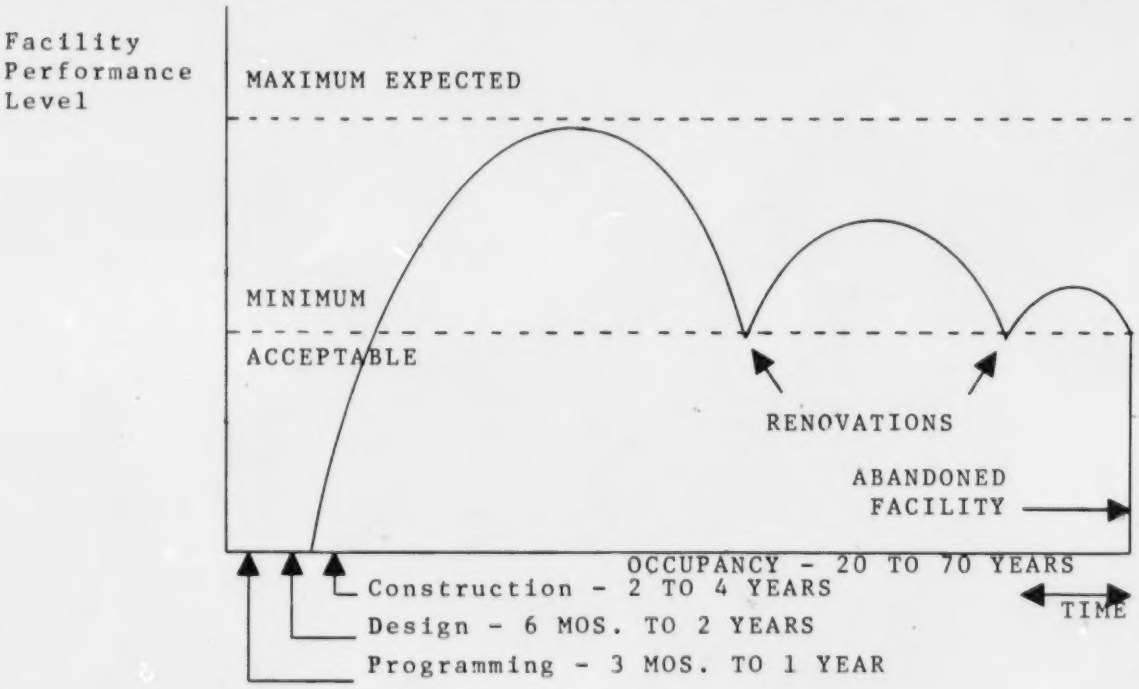


Figure 3.
Facility Performance Level

There are many persons and many reasons that cause building decay. A paragraph excerpted from deferred maintenance funding requests for the University of Nebraska at Omaha could be applied to many institutions across the country:

> "The circumstances leading to the present situation developed over a period of years. Prior to becoming a part of the State University system, U.N.O. had a limited summer maintenance program during which painting and repair projects were performed while student activity was at a reduced level. The rapid growth of the University, both in its physical plant and in the number of students attending on a year-round basis, has made it impossible to continue that limited program. Funding of maintenance activities from a continuation budget with average inflation allowances and small increases for new construction has contributed significantly to the problem of deterioration. The rate of inflation in the building construction industry has been greater than the cost of living average. Unavailability of funds coupled with the increasing age of certain facilities has caused a backlog of essential maintenance and repair to develop."

The level of maintenance provided to a facility is the responsibility of the physical plant director using the available financial and staff resources. A brief classification of the causes that create deferred maintenance problems include:

1. Lack of maintenance input into the design/construction building phase.

    a. Inaccessibility
    b. Use of materials that have a limited life cycle
    c. Inferior construction and lack of intelligent inspection
    d. Space assignments inconsistent with facility use.

2. Lack of operating funds

    a. Insufficient labor force
    b. Lack of tools, equipment and supplies
    c. Lack of training
    d. Inadequate technical and engineering staff support
    e. Inability to create reserve accounts for major life cycle replacements, i.e., roofs, mechanical equipment, etc.
    f. Inability to compensate for inflation

3. Miscellaneous causes

    a. Intentional maintenance deferral due to building obsolescence

b. Inadequate maintenance procedures and programs
c. Incompetent management
d. Equipment obsolescence
e. Restrictive personnel and employment policies
f. Restrictive purchasing procedures

The actual building survey process and the forms developed to establish the deferred maintenance backlog are not unique. Examples are provided below and can be adapted for specific campus needs. In the preliminary stages existing data on buildings, grounds and utilities should be organized so that all historical data including drawings and specifications and previous maintenance records are readily available. Whether manual or computer assisted a simple facility identification system is essential.

A checklist of critical items to be considered for the survey are:

- Responsibility.
  Clear-cut identification of an individual or team responsible for the survey work is essential. When consultants are retained, lines of responsibility and authority are required.

- Scope of survey
  All aspects of facility surveyed and grouped by construction systems; e.g., exterior general construction; interior general construction; mechanical, electrical and plumbing systems; built-in equipment.

- Organization of data
  Complete survey of facility presented in tabular summary by major category of work: (1) health and safety items; (2) general construction, exterior; (3) general construction, interior; (4) building systems; and (5) built in equipment. Back up information for each item in summary for future use in budget development.

- Survey forms
  Several sample forms from Syracuse University, University of Nebraska, and the St. Louis Community College are included in Appendix B. The forms contain three elements.

1. Building description with location, survey date, person preparing survey form
2. Body of form. Each item is identified with estimated quantities, unit prices and total cost. Fees and contingency are to be noted if included
3. Justification. Brief narrative justifying project.

The form should note items of priority, excepting health and safety or code compliance items for special importance. The preparation of survey forms should all consider:

- Cycle of inspection
  The maintenance inspection period for all major building elements should be performed on an annual basis. Again, health and safety or code compliance requirements should receive priority attention. Items of minor nature such as painting can be given less frequent attention whereas filters and components requiring frequent replacement should be checked on a prescribed cycle. Judgement is required to concentrate on deferred aspects and not slip into the maintenance inspection necessary for the management of a scheduled maintenance program.

- Reuse of survey
  A well prepared deferred maintenance survey can have reuse for two functions. First it can be applied to development of annual budget requests. For this reason the justification of the project and its priority classification are important. Second, the survey can provide the basis for the development of a scheduled maintenance program. Attention should be given in the organization period of the survey to potential future uses, including possible automation of information.

- Costs
  Identify source of estimates, date of validity to compensate for inflation. Describe recommended bidding of award to institutional staff, award, negotiated or competitively bid.

In summary the deferred maintenance survey should be guided by sound professional judgement. The project should be undertaken with the spirit of the the Nebraska enabling legislation:

"each agency shall also estimate the cost of adequate scheduled and preventive maintenance and shall prepare a schedule it feels necessary to provide adequate but not excessive preventive maintenance."

III. PRESENTING THE CASE

"You can pay now
or you can pay later."

That was the simple title of the Nebraska State Legislative report on the maintenance of buildings. The subtitle was: a small expenditure made early would have saved the large costs now faced. The exact techniques for budgeting needs or obtaining sources of funds has varied from state to state or institution to institution, but this is a detail reached after the broader question of establishing the need.

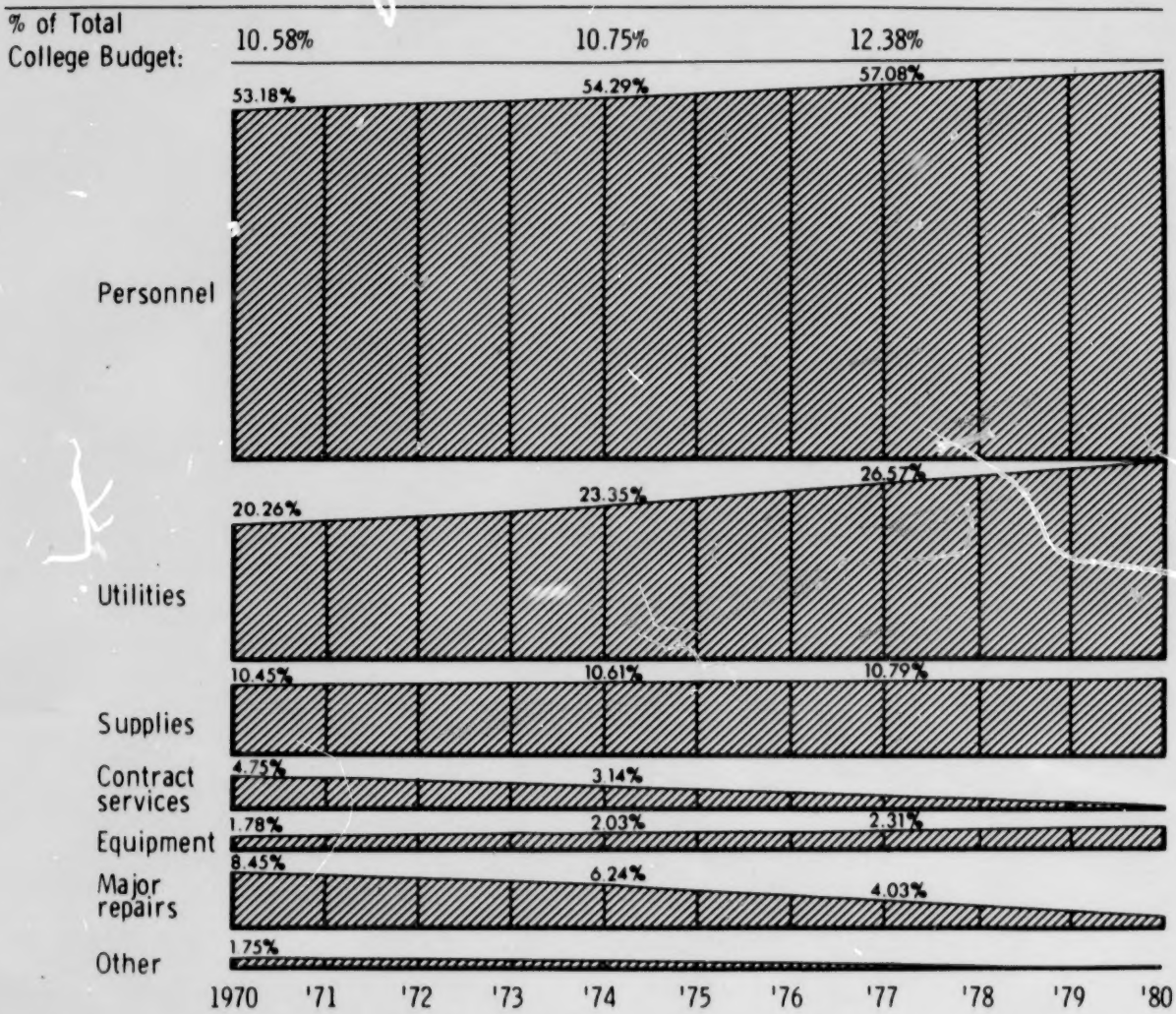
The presenting of the case for funding deferred maintenance is made with the recognition that overall system or institutional budget needs are at issue. Historically, one of the easiest areas to reduce requests or current costs is in maintenance of facilities. A long period of this practice causes a backlog of deferred maintenance projects to develop. Once a backlog is established the emergency repair projects command all of the funds and further deterioration of facilities occurs. This is the litany repeated over and over again. Remember that maintenance dollars are unpopular and unromantic. Why would any leader seeking stability in his budget or support from constituents support an expense that can be deferred to his successor?

Reinforcement for the general statements made come from the broad view of constraints being placed on maintenance budgets. APPA has summarized the effects on physical plant financial resources over a ten-year period, 1970-1980. The data shows graphically how a false picture of <u>increased</u> shares of institutional budgets is developed. Because utilities are typically included in operating budgets for physical plant the actual dollars available for plant maintenance are <u>reduced</u>. Furthermore, the increases in personnel costs have further decreased funds available for major repairs, the category where deferred maintenance is most likely to be found. An important step for the facilities manager in presenting his case is to remove utilities from the maintenance funding and place it as a separate budgetary item.

The University of Maryland survey of physical plant costs in figure 4 over a twelve-year period reinforces the presentation on funding for plant maintenance. In this example total costs have been corrected for inflation. Again, utilities take a major share of the maintenance dollars while supply and material expenses shows a net decline.

A further discussion of the support on funding and effects of deferring maintenance available for the facilities manager is the portion of a paper prepared by Donald Parry of the State of Maryland Department of General Services included in Appendix C.

EFFECTS ON PHYSICAL PLANT FINANCIAL RESOURCES



Although a technical approach to estimating the cost of deferred maintenance, data can be developed to show how maintenance costs increase to proportions approaching total replacement of a facility.

However, this detail deals with the kind of material necessary to support a presentation on the justification for deferred maintenance funds. There is a broader view necessary. Assume that the facilities manager has decided to take the initiative on deferred maintenance; or that a senior administrator has asked for an examination of the situation. What is essential in developing the appropriate presentation? Items to be considered include the following:

- Overview
  A broad understanding of the institution or system's budgetary mechanism and present position. Long term institutional policies when translated into a physical planning policy can lead to support for overall goals.

- Credibility
  The performance record of the facilities management staff. An ability to soundly manage previously allocated funds and take initiative on the improvement of the allocation of resources will help in gaining support for new programs. Part of this is a well-respected management staff in a clearly understood organizational structure. Credibility must be continually reestablished.

- Competency
  Although previous success in budget management and execution of assignments may exist, the support for a new program such as deferred maintenance may be hard to secure. The introduction of case studies may be of assistance to illustrate knowledge of developments elsewhere as well as literate reports and supporting documentation of local needs.

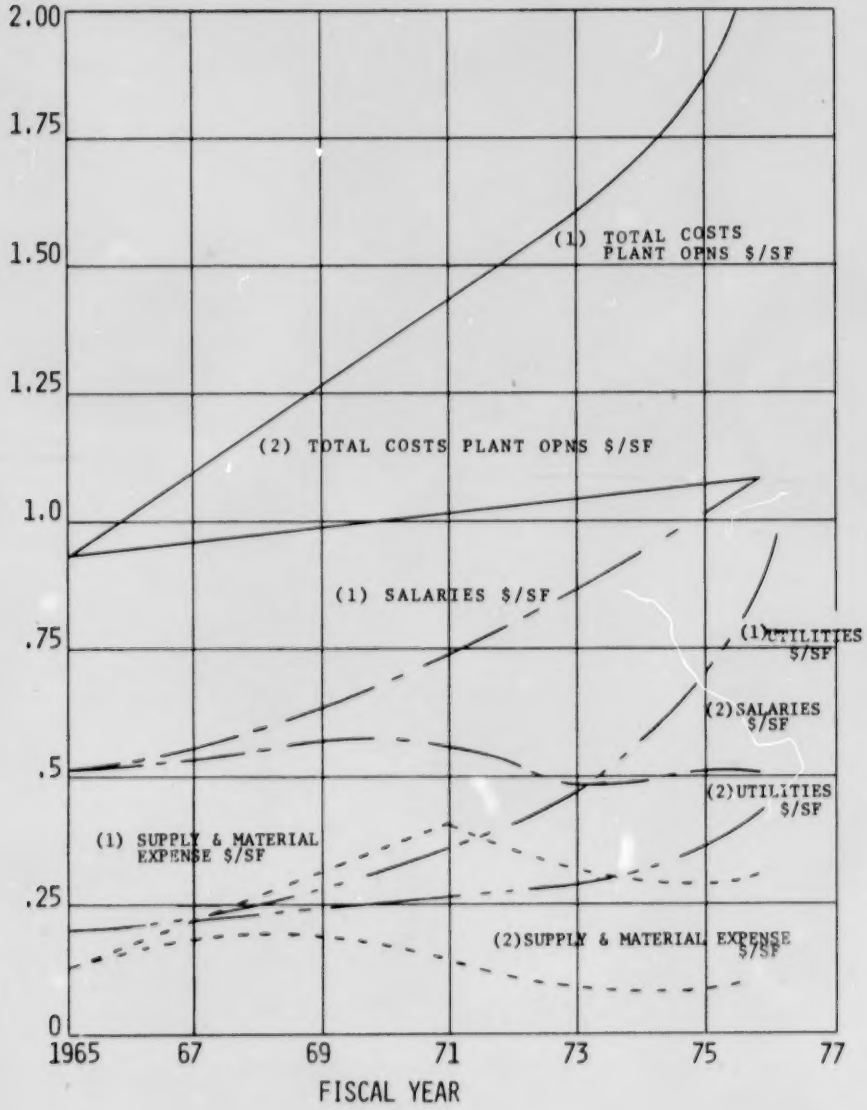
- Thoroughness of Preparation
  The presentation on deferred maintenance will typically be made to senior administrators who are academicians. Not only will the form of a presentation be given close scrutiny but so will the substance. Data must be non-contradictory and be capable of withstanding thorough scrutiny. Limited consultant assistance may aid in preparation of a presentation but the documentation should be substantially prepared by resident staff.

Figure 4 UNIVERSITY OF MARYLAND COLLEGE PARK
DEPARTMENT OF PHYSICAL PLANT

ANNUAL UNIT COST FACTORS EXPRESSED
WITH RESPECT TO COST PER SQUARE FOOT

DOLLARS PER SQUARE FEET

1. In Actual Dollars
2. Corrected For Inflation



- Sympathetic Senior Administrator
  The budget of an institution is a document representing components in competition for limited financial resources. It is in fact part of a campus political process. Without the assistance of a strong advocate in senior administration the case for deferred maintenance has a difficult path to follow. Thorough orientation is necessary, with accuracy of data and reliability in staff ability to carry out a program.

- Preparation tor Implementation
  The final item is the ability to implement a program of deferred maintenance if funds are made available. Decisions on staff assignments, use of staff vs. contractors and bidding procedures should be made for rapid execution of proposed assignments. Inability to expend funds made available can cause prompt termination of a new program.

To summarize the items we have outlined professionalism as a keynote trait of the facilities management leadership and staff. Opportunities to present deferred maintenance requests may not be repeated and thorough preparation is essential.

In addition to securing funds from normal budgetary channels external sources may be pursued. Examples are currently in the HUD College Housing Loan Program for energy conservation. Other federal programs may arise as well as state or private sources. The supporting documentation for these programs can provide the approaches and language suitable for local adaptation. Justification for deferred maintenance can be found in energy conservation, improving accessibility for the handicapped and economic assets such as creation of jobs and improvements in local economies.

In the final analysis, the development of deferred maintenance remains the responsibility of the facilities manager. Legislatures and chief executives may press the inquiry but the justification, development and implementation of the program rests with the people who know the operation and maintenance best. The challenge is sizeable--but so is the satisfaction involved.

IV. PREPARING TO MANAGE

Organization

The request for increased resources for facilities management has a concomitant relationship to the capacity to manage. As absurdly simple as this may sound, when campaigns to increase funds for maintenance have yielded successful results the process of correcting deferred maintenance has only begun. Because of the visible nature of facilities they become symbolic of the fiscal stability of an institution. Thus, facilities management becomes representative of the institution's overall ability to manage its resources. Although this may seem to overemphasize the role of the facilities manager it serves to place the responsibilities involved in identifying goals, establishing an organization to execute work and adopting policies and procedure to assure a program with a strong sense of accountability.

The basic goal of facility management is to insure (1) the availability of adequate facilities for the academic enterprise, which are (2) maintained in suitable condition for user satisfaction and (3) using a minimal share of the institution's budget. What are the characteristics of an organization and its members to meet this goal? How many and what kinds of people with what types of skills are necessary? What are the relationships within the organization and the relationships to other parts of the institution's administration? There are no universal answers to these questions. They must be addressed to the unique nature of an institution. However, there are general relationships and functions which are applicable to all types and sizes of institutions.

Of primary importance is the location of the administrative officer for facilities administration in the institution's organizational structure. The unequal treatment of budgetary requests for facilities and a sharing of priorities will only worsen the deterioration of facilities and result in weak administrative decisions to reduce initial building or regular maintenance costs; decisions which should always be regarded in terms of the future risks involved and long term costs. It is important that the administrator of an institution's physical resources should be at the same staff level as heads of other administrative services with direct access to the institution's executive management and an opportunity to present budget requests.

The readiness of the institutional management to place facilities matters at low priority is a recurring habit. The permanency of buildings lends a false sense of security in the deferring of maintenance. In some ways, this is due to the inarticulateness of managers of facilities in comparison to fiscal and personnel managers in higher education. The managers of facilities should have an equal opportunity to share in overall institutional resources and influence decisions on their allocations.

A suggested schematic organization is shown in figure 6. General activities reporting to a senior administrative officer are:

1. Fiscal and auxiliary. Typically described as a chief business officer, this function manages accounting, auxiliaries and general relations with vendors to the institution through purchasing procedures.

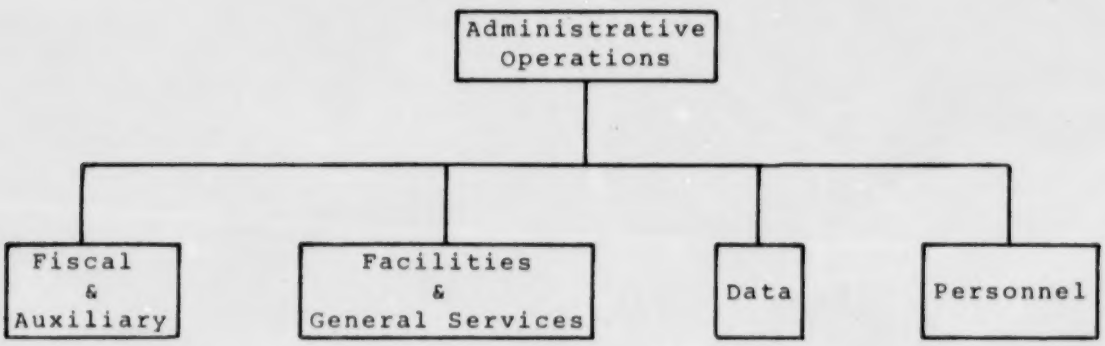
2. Facilities. This function should be responsible for operations of all institutional buildings, grounds and utilities. Included may be such facility related areas such as telecommunications, mail, real estate, transportation, parking, and safety and security.

3. Data. The emergence of information needs to support student data systems, personnel systems, alumni and development operations and fiscal management suggests a centralized activity.

4. Personnel. The management of systematic personnel procedures and reporting requirements can be consolidated into a single unit.

Figure 6.

Institutional Organizational Structure



Dealing specifically with the facilities and general services element of the organization brings us to the unit responsible for facilities management of an institution. Organizational structures for facility management and its relation to other administrative services will vary by size of institution, traditional patterns of organization and capabilities of individuals.

The organizational structure should also be adaptable to changes in institutional goals and policies, and staff abilities.

Major functional activities of the facilities management organization include:

1. Operations and Maintenance:
   a. General emergency maintenance
   b. Preventive maintenance
   c. Deferred maintenance
   d. Vehicle maintenance
   e. Utilities

2. Facilities Planning
   a. Planning
   b. Space data systems
   c. Architecture and engineering services
   d. Construction supervision
   e. Energy conservation planning

3. General Services
   a. Custodial & housekeeping
   b. Telecommunications
   c. Mail
   d. Transportation
   e. Parking
   f. Safety & Security

4. Energy Management

In order to manage these activities facilities managers should have three essential capabilities: (1) budget and development management; (2) personnel management, and (3) knowledge of facilities.

The demand for accountability of fiscal resources requires specialized skills available in the individual trained and experienced in budget preparation, accounting procedures, data processing systems and fiscal analysis. Although the ultimate burden of fiscal responsibility must be assumed by the administrator, basic fiscal controls and sources of data can be provided by a person acting in a capacity similar to that of a comptroller. Budget preparation and review are an on-going process; it represents one of the administrator's strongest tools of management. A regular review of budget status with a forecast of the year's program is essential. Formal preparation of the budget document which guides annual operations is not a single event but one which requires regular comparisons of actual events to the budget and with previous years. The basis of accurate and and timely data has shifted from hand posted ledgers to sophisticated data processing systems. Notorious for being under constant development or revision, data systems for budget management must be managed from the perspective of the facilities administration. The staff assignment for fiscal management should also have the responsibility for coordinating fiscal data processing.

Another functional responsibility, personnel management can be part of the administrators staff or through a representative of a central personnel department. However, this task requires the knowledge and skills of a personnel specialist. Consistency with institutional policies in job descriptions, employment searches, hiring, promotions, terminations, retirements and job interruptions have been made essential to an institution's operations by procedures mandated by legislation and external agencies. Functional responsibilities for managing physical resources are grouped under five major areas, two staff and three line (see figure 7.) (1) fiscal; (2) personnel; (3) facilities planning; (4) operations and maintenance; and (5) general services.

Fiscal management, includes budget development, accounting functions and management, information systems. The function is located with facilities administration to provide close, regular contact with daily developments. Location in a position decentralized from the institution's overall comptroller functions requires measures to assure consistency with standard budgeting and accounting practices. Accounting functions for physical resource management must be responsive to managers making daily decisions on operational procedures and incurring of encumbrances. An extension of the fiscal management tasks are the information systems developed for providing reports summarizing unit activities. From these reports the analyses of performance can be produced for executive evaluation. In order to meet this objective, systems development is incorporated into the fiscal area, either by assignment of personnel or liaison with a centralized systems development group.

One of the major areas of responsibility, facilities planning, provides technical support in the areas of physical planning policy, maintenance planning, architectural and engineering, and construction

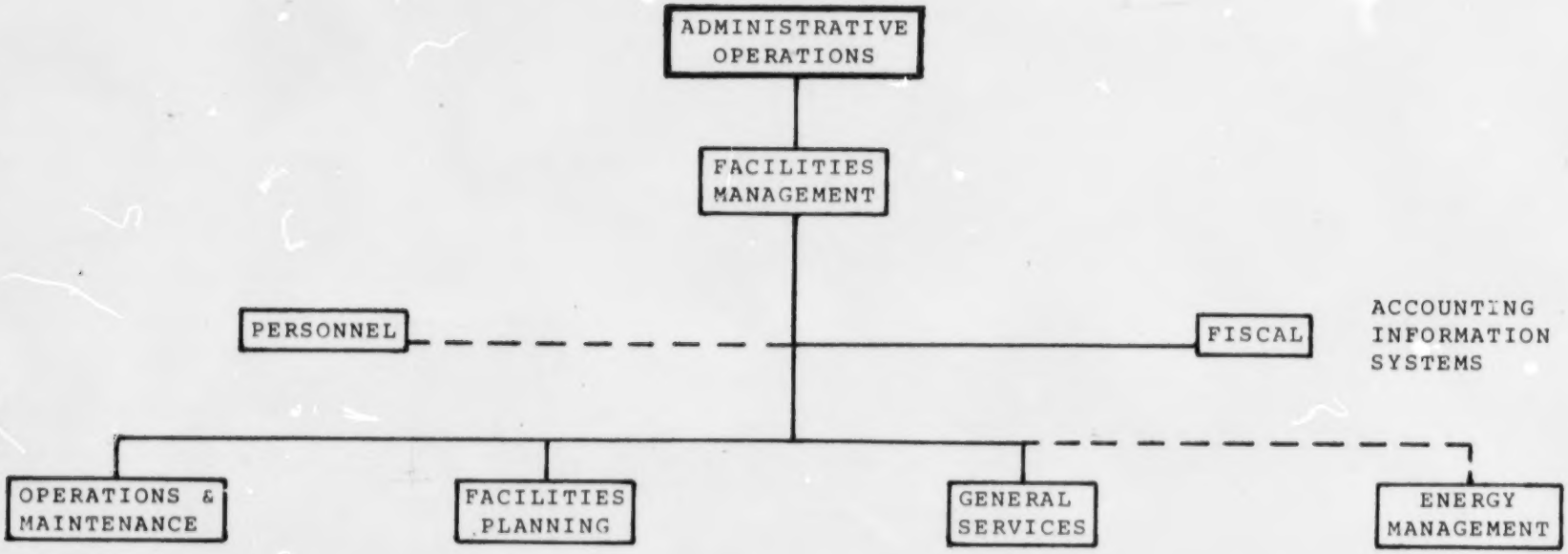


Figure 7.
University Resource Management Physical Resources

management. A careful balance should be made between development of an institution's staff and the use of consultants. It is important to balance staff size proportional to need to avoid excessive buildings of staff. The advisory function in matters of the institution's capital needs requires not only technical knowledge but an ability to be responsive to requests for information. The planning and space utilization function relates to the highest level of administrative decision making. A sensitivity to the policies and personalities of an institution is also essential in this area. Assistance to decision-makers in the formulation of policy is provided by information available through the technical staff. This information includes quantitative and qualitative data on the institutions space and facilities. Regular surveys of facilities to determine condition and usage should be developed for ready access and updating in management information system.

The interpretation and application of policy through technical abilities of the architect or engineer occurs through staff efforts in design and construction, or through management of consultants. Because the facilities planning group is so close to the creation and implementation of policy it requires strong administrative leadership.

Another area is operations and maintenance, traditionally called "physical plant" or "buildings and grounds". This group provides the personnel, materials, experience and technical knowledge to operate and maintain the institution's buildings, grounds and utilities. Whereas the facilities planning group plans additions or modifications to the institution's physical resources and operations and maintenance, management is concerned with the availability of existing resources for designated usage in a sound condition. In addition, the group is responsible for providing maintenance which prevents unavailability of resources. This work must be coordinated into a comprehensive program which initiates maintenance work as well as responds to emergencies and other requests for service. The need for a "regular" maintenance program which meets the criteria of initiating as well as responding is essential to the management of physical resources. Continuous efforts are necessary in this area to maintain a high level of service and increase productivity.

General services includes many support functions to an institution. Size of student body, location in urban or rural areas, and amount and condition of physical plant will dictate the type of force required. These factors also influence the location of these functions in an organization's structure. Regardless of whether they are grouped with facilities administration or under the business management area close coordination with the facilities planning and operations and maintenance staff is vital.

Policies and Procedures

Management of deferred maintenance has similarities to policies and procedures for regular and preventive maintenance. There are also similarities to capital construction. Major differences to the institution's on-going programs of maintenance or major additions to plant are that the work is of a capital nature, the program is specific in its time period with limits for completion, the work is performed on facilities in current usage, and projects require careful planning concerning existing conditions to avoid cost overruns or excessive contingencies.

The first two factors, capitalized projects and limits to the period of work is further complicated by work usually being performed on portions of a structure or a building's systems. For example, deferred work may be required on only the exterior of a structure, or its mechanical systems or only its electrical systems. A complete building rehabilitation of all structural components, exterior, interior finishes and building systems should be treated in a manner to distinguish it from deferred maintenance.

Two distinctions to be made are in the portions of the work to be actually planned by the institution's facility planning staff and executed by the operations and maintenance staff. An important criteria is the avoidance of excessive staff buildings to handle the "one-time" nature of a deferred maintenance program.

A small institution will best retain consultants to plan work and evaluate the capabilities of operations and maintenance staff to execute the work. Some subcontracting may be needed to augment the seasonal availability of permanent staff. As the size and complexity of an institution increases in size the core facilities planning staff can allocate time to perform work on projects. It will be necessary and possibly more appropriate to retain permanent staff in the role of planning and coordinating maintenance, capital additions and deferred work with consultants used to prepare contract documents and supervise construction.

The amount of construction work performed by permanent operations and maintenance staff will be influenced by seasonal workload and specialty skills required for a project. Institutions with extensive summer programs or continuing education activities will need close coordination of the operations and maintenance staff with little opportunity to tie up special trades on construction work which may be interrupted by emergency maintenance requirements.

A guideline in the expansion of staff for deferred maintenance is the view towards returning the employment base to steady-state operations. Although conditions of employment on short-term projects may be clearly outlined and understood by all parties, the process of separation may not be a simple task. The notion of "in-house" staff being less costly than consultants or contractors because of varied assignments and avoidance of the vendors profits and overhead must be weighed against the true compensation of each additional employee.

The view towards deferred maintenance programs as an effort to return maintenance needs to a program of regular annual activities rather than capital funding requires careful consideration for the pattern of assignment of planning and construction work. Clear decisions on this matter are based on policies and procedures involved in performing campus maintenance.

EVALUATING FACILITIES MANAGEMENT

Guidelines for evaluating facilities management are intended to assist campus officials to appraise the effectiveness of the institution's organization for managing the upkeep and replacement of its physical plant. Particular attention should be given to how responsive the total facilities management program is to changing campus requirements, cost considerations, levels of enrollment, employee attitudes, and related factors affecting the environment in which the functions are carried out. A significant aspect is appraising the management of facilities maintenance and repair activities, and how well they are meeting the institution's operating requirements, both in quality and cost of services provided. Another level of interest concerns the effectiveness with which the facilities management program is coordinated among such closely allied activities as architects and engineers, environmental health and safety, risk management, police and fire protection, purchasing and storehouse, student affairs, housing and food service, and with schools, departments and research activities.

PART A. *Institutional Policy and Organization*

These questions are concerned with the general organization and management of the facilities management functions with respect to the campus as a whole. They emphasize such functions as planning, budgeting, setting policies, delegations of authority and exercising responsibility.

1. Is there a written policy which clearly defines the responsibilities and authority delegations for the management of physical facilities?

2. Do the authorized officials and other campus managers and personnel understand this pattern of responsibilities and authority and feel that it is effective in meeting their operational needs?

3. Is there a clear understanding throughout the campus relative to (a) limits to the facilities management unit's responsibilities in providing regular services, (b) those that are the responsibility of other campus departments, (c) those that will be provided only on a fee basis? What type of problems have developed as a result of misunderstandings, and have they been resolved effectively?

4. Is the schedule of fees current, generally available and properly applied?

5. For each of the major categories of facilities management activities is there a formalized long range program that is related to available budgetary support, responsive to emergency or other unscheduled requirements and used as a basis for reporting and evaluating performance in relation to goals and objectives?

6. Are program decisions on distribution of resources and redirection of services based on rational analyses of campus requirements and priorities and assessment of impact? Are they made with adequate campus and top management involvement?

7. Is the short-term operating system for the planning, scheduling, estimating and control of each of the major categories of activities effective in the use of personnel, balancing of workload and in meeting campus requirements and priorities? Are these activities effectively coordinated with work performance and reasonable in cost of administration in relation to the magnitude of the activities?

8. Is there an established policy on the use of contract vs. in-house services based upon periodic and objective cost-effectiveness analyses of these alternatives under current conditions?

9. Is there an effective and equitable accounting and financial reporting system for activities, including a back charge system that is informative to facilities management, other campus departments and campus top management?

10. Are cost estimates for various individual job costs and standard cost charges analyzed regularly in relation to actual costs and charges and reviewed with the physical plant staff, affected campus departments as well as with campus management to promote full understanding and acceptance?

11. Has an effective preventive maintenance program been implemented for those portions of the physical facilities, equipment and utilities where it is appropriate and is it being carried out to the benefit and satisfaction of the campus?

12. Is adequate attention being given by the facilities management unit and the campus personnel staff to the unique and significant problems of supervision, non-discrimination, recruitment, employee relations, grievances, training and career development that are involved with the various categories of physical plant employees?

PART B. *Functional Coordination and Relationships*

These questions focus on the interfaces among the various campus departments and personnel concerned with facilities management activities and the responsibilities of line managers and other campus staff offices.

1. Are the responsibilities and practices of the facilities management office clearly defined and differentiated from the responsibilities of campus line managers and other campus staff offices?

2. Does the facilities management staff maintain effective liaison, and have an influence on decisions relating to the following campus programs, planning processes and operations:

a. design, rehabilitation, operating requirements, alteration and preacceptance inspections of buildings, other structures, grounds and major items of equipment?

b. heating, cooling and other utility systems, rate schedules for utilities and changes in service?

c. environmental health, safety and risk management matters?

d. student activities and special event scheduling?

e. academic planning?

f. research contracts and grants involving facilities, space, acquisition or use of major items of equipment and special services?

g. negotiations with employees and representatives of employee organizations?

h. the review and auditing of utility bills and other major charges for physical plant services?

i. changes in space use, including classroom conversion or reassignment; alterations in space; creation, expansion and use of shops; and inventories of current space utilization?

3. Is there an effective working relationship among the facilities management personnel, campus departments, and the campus security office to keep interested offices informed on the condition, plans for use, abuse of equipment and facilities and the security of physical facilities and equipment throughout the campus?

4. Do the physical locations and operating relationships among purchasing, central storehouse, inventory and facilities management personnel promote efficiency, economy and effectiveness in these operations?

5. Do facilities management personnel have ready access to a well organized set of designs, specifications, as-built drawings and alteration records for all physical facilities and major pieces of equipment on the campus to carry out their responsibilities?

6. Have the role, actions and responsibilities of facilities management personnel in various emergency situations, ranging from labor disputes to natural disasters, been clearly delineated and made known to key personnel throughout the campus?

7. Have the role and responsibilities of facilities management with respect to changes in space use been clearly defined?

8. Are there unresolved areas of responsibility for the maintenance or repair of physical facilities, grounds and equipment under campus jurisdiction, particularly for off-campus locations or for new and novel programs?

PART C. *Operations*

These questions are mainly concerned with the administration and performance of the tasks involved in providing services to the campus. They also direct attention to the operations of the facilities management office.

1. Do the step-by-step operational procedures involved in responding to a request for maintenance or minor construction service reflect:

a. up-to-date documentation of the process that is widely known and easily understood by the campus?

b. attention to problems of backlog and deferred service? Are these excessive?

c. assignment of reasonable priorities related to balancing of workload and customer requirements that are communicated to interested parties?

d. reasonable identification of specific job costs and support of recharge statements?

e. adequate attention to realistic cost estimates throughout the life of the job, particularly revisions of cost estimates, analysis of the causes of revisions, and communication of these revisions to interested parties?

f. an equitable and reasonable system for determining and allocating indirect costs and markups to specific jobs?

g. an effective system of communication between the work forces and their supervisors, including staff meetings, special message handling and contact at work stations?

2. Is there a formalized, current schedule including information on each special maintenance and construction job that is used for internal management and to keep customers and campus management informed of status and progress?

3. Is there an effective program of balancing staff requirements for special skills and peak demand through the use of outside journeymen and contracts for craft services?

4. Are there effective maintenance, operating standards and preventive maintenance programs for high-value or critical pieces of equipment and facilities? Are they evaluated as to their cost effectiveness periodically?

5. Are significant operating or maintenance problems systematically analyzed as to cause and effectively communicated to the architects and engineers office to avoid repetition of shortcomings in design or specifications?

6. Are changes in work orders documented and are cost and time estimates adjusted to reflect such changes?

Custodial and Grounds Services

7. Are the work assignments and standards of performance for custodial and grounds personnel developed and periodically reviewed to assure their adequacy to meet campus needs at reasonable costs with due consideration to the interests of employees, supervisors and customers?

8. Is work performance regularly checked against these standards?

9. Is there a high level of morale, effective interaction with faculty, staff and students and commitment to accomplishment of campus objectives evident in the custodial and grounds crews?

10. Is sufficient attention being given to cost/benefit studies which compare first cost to project life costs of the introduction of new equipment, labor-saving techniques and other innovations in the custodial and grounds activities?

Utilities

11. Is there an energy conservation program which includes analysis of alternative sources of energy, making feasibility studies of central control systems and otherwise responding to fuel and power shortages and cost increases in cooperation with other elements of the campus and external groups involved in this problem?

12. Are campus utility policies and programs responsive to campus requirements for auxiliary heating, cooling, power other utility requirements? Are these services operated and funded in an acceptable and equitable manner?

13. Are unauthorized uses or extensions of utility services being detected and adequately controlled?

Materials and Supplies

14. Are the procedures for the handling of requests for materials, supplies, and tools used in operations meeting operating requirements?

15. Does the unit have an effective role in the identification of used, obsolete or excess equipment and materials throughout the campus in a timely and orderly manner?

16. Is there adequate security and control over equipment, tools and materials? Are losses analyzed to determine if system or management deficiencies are involved and require correction?

17. Is information disseminated concerning new products, equipment, supplies and materials which could result in either labor saving or other cost savings to subordinate staff?

Use of Space and Key Control

18. Is there documentation and analysis of space allocations and utilization throughout the campus that is current and useful to campus management?

19. Are space conversions and reassignments based upon a thorough analysis of alternatives and costs and a rational decision-making process with adequate participation by facilities management staff?

20. Is there an adequate key control system which effectively prevents the unauthorized possession of keys?

PART D.

This is a listing of such items as policy references, procedural documents, workload data and measurements, and performance indicators which will be helpful to the review team in conducting the appraisal.

1. Schedules of maintenance inspections of buildings, other structures, equipment, grounds and other facilities for the current year.

2. Copies of a selected sample of maintenance inspection reports with a description or other evidence of follow-up actions.

3. Reports on other phases of campus facilities management activities, particularly those showing comparisons between goals, planned actions, cost estimates and actual performance.

4. Copy of the latest budgetary request and justification for the facilities management program.

5. List of contract services in effect during the past year to carry out the physical plant activities on campus.

6. List of current deferred maintenance projects or requirements.

7. Copies of emergency plans for critical facilities services.

- Adapted from a chapter entitled Management Appraisal Guidelines: Facilities Management contained in a book entitled Appraising Administrative Operations: A Guide for Universities and Colleges, by Gerald Griffin and David R. Burks, published by University of California Systemwide Administration, Berkeley, California, in 1976. It is reproduced with the permission of the publishers.

1. ST. LOUIS COMMUNITY COLLEGE - FOREST PARK CAMPUS

CONDITION OF FACILITIES

A review was made of the current physical condition of all buildings, grounds, utilities and equipment. The Forest Park facilities have received outstanding care by the students and staff and the custodial staff and Physical Plant supervisors have in particular been most conscientious in maintaining the appearance of the facilities. There is normal wear in some areas but no outstanding problem exists regarding plant operations and maintenance. At one time funding levels for repair and maintenance were too low, but this has been improved and the needed work can be scheduled within the amounts of project funds now being authorized.

Repair and Alteration Contracts in 1975

Contract No.	Title	Amount
1564-FP	Power & Lighting for Student Activities	$ 525.00
1549-FP	Partitions for ISI Lab	1,074.00
1551-FP	Metal & Glass Wall & Wood Doors	1,680.00
1555-FP	Electrical Power for X-Ray Equipment	350.00
1556-FP	ISI Lab Counter	2,474.00
1538-FP	Removal of Concrete Bollards	572.00
1540-FP	Wall in Room D-414	468.00
1544-FP	Replacement of Broken Glass	394.00
1520-FP	Cooling System for Engineers Control Room	779.00
1522-FP	Revisions to Room L011	1,290.00
1526-FP	Information Service Desk	995.00
1527-FP	Carpet Mezzanine, P.E. Bldg.	735.00
1528-FP	Concrete Slab for Trash Compactors	1,205.00
1530-FP	Wire Partition, Gym	2,090.00
1502-FP	Gym Control Room	1,585.00
1510-FP	Repair of Elevator Casing	5,220.91
1511-FP	Gym Supplemental Door Security Alarm	662.00
1516-FP	Trash Container Pad	917.00
1495-FP	Repair Tile Floor Room 302	250.00
75-19	Painting in Library	2,520.00
75-18	Striping at FPCC	3,740.00
75-17	New Metal Railings	3,499.00
75-16	Painting College Center	3,799.00
75-15	New X-Ray Lab	2,975.00
75-14	Interior Painting E. Wing	3,091.00
75-13	Carpet in ISI Lab	5,160.00
75-12	Painting of Gym Stairwells	3,400.00
75-11A	Pre-signal Alarm System Revisions	3,360.00
75-11B	Routing of Fire Alarm Cables	1,327.00

Contract No.	Title	Amount
75-10	Lighting of Gym Stairs	$ 2,899.00
75-9	Remodeling of College Center Lobby	41,025.00
75-8	Revisions in Library for ISI Lab	1,770.00
75-7	Revisions to Data Processing	7,263.00
75-6	Roof Repairs	11,893.00
75-5	Darkroom in X-Ray Lab	3,943.00
75-4	Carpet, Lecture Hall	3,508.00
75-3	Revisions to Control System	6,380.00
75-2	Gym Floor Striping	6,473.00
75-1	D Tower Security Station	2,448.00
75-60	Renovation of Sound System	10,022.00
74-6	New Concrete Steps to Replace Asphalt ramp	2,575.00

There were additional repair and alteration projects completed by the maintenance staff at Forest Park. The above list includes only contract work.

Following is a list of deficiencies found during this review of facilities, but this listing is only representative of a short inspection period and must be followed up by a detailed inspection by the college staff on a scheduled basis, to identify all work required - and to assign priorities for orderly accomplishment.

ANNUAL FACILITIES REVIEW OF FOREST PARK COMMUNITY COLLEGE

FUNCTION: BUILDINGS

General. As noted, all facilities are generally well maintained. The East Wing and the Library/Boiler Plant complex are now approaching nine years of age and there are items of work needed to maintain their appearance. Examples are major repainting (now in progress), carpet replacement in some high traffic areas, and exterior concrete work.

Caulked joints in precast concrete panels need repair, as does brick paving. Funds have been budgeted for much of this work, but not all.

There are many areas used for storage, such as spaces in I.R., in the West Wing, Physical Education Building, Room A011, B011 and other East and West Wing areas. These spaces tend to become catch-all with items remaining for years until no one has knowledge of "why and when" items were stored. It is suggested that one department, such as the Physical Plant Department, be given custody of these storage rooms and that the storage areas be inventoried and space allocated to college divisions and departments

according to need. This may help identify available storage areas, and may avoid having various paper stacks and admission forms and brochures kept in several places. In other words have one person manage all storage areas.

Maintenance Manuals. There is a complete set of HVAC manuals as well as some plumbing and sprinkler manuals available in the "M" level engineer's office. These are for use by the managers and staff in performing the work and appear to be well maintained.

Shop Drawings. Almost all are on file in the Plant Operations Office; only problem is that the shop drawings for 65-2 and 66-3 have been "lost".

College Center:

Point of connection between roof of College Center and West Wing has deteriorated flashing and the caulking needs repair. The roof drain is set too high in this area also.

Completed. Student Publications Room: many signs and notices put on walls and when removed paint comes off with tape. Need redecorating and addition of tack boards - all walls.

Completed. Room U-109 "Treasurer's Room" - needs repainting.

Completed. Student Council area has poor air circulation and should be checked.

When painting is to be accomplished in the various student services areas, thought should be given to a more decorative color scheme. Existing colors and decor are "institutional".

Completed. Door between dining room and patio needs adjusting to close properly.

Carpet is shrunk away from walls in east hall, near Child Care Center.

Carpet needs replacement in Admissions area and on some stairways.

West Equipment Room:

Radiation pumps #302 and #303 - both okay.

Heat exchangers #302 and #303 - both okay.

West Equipment Room: (Cont.)

Completed. AC/303: Several air leaks in high pressure side of unit.

Completed. Some noise and vibration at discharge end of unit.

AC/302:

Completed. Dampers need cleaning.

Unit runs quiet, good condition (other than dirt on dampers).

Return fan #303 - okay.

Equipment Room U237:

Exhaust fan 305 - good condition, recently cleaned and overhauled.

East Equipment Room:

AC#300 - dampers dirty.

AC#301 - dampers dirty.

Relocated control items need to be piped permanently and old holes plugged in outer casing of unit(s).

East Wing Library:

East Wing roof repairs are needed and have been budgeted by the college.

Completed. Library and East Wing carpet seams are in need of repair to stop unraveling. This can be stopped but no satisfactory way has been found to restore the appearance.

Completed. Library furniture is holding up very well. Upholstered chairs need cleaning but otherwise in good condition.

Library Administrative Offices are very cluttered with piles of papers and books. Perhaps storage space is needed, or simply a more frequent elimination of extraneous material.

East Wing Library:

Chemistry Lab, B319, was very dirty with almost all lab work areas uncleaned, sinks dirty, and fume hoods all unusable because of abandoned material from past work. B317 was more orderly, but shows evidence of past lack of concern for spills.

Completed. Fire extinguishers have been placed in cabinets on the wall. It was suggested by occupants that some of these are in restricted high traffic areas and perhaps could be relocated.

Faculty labs do not seem to be used and are generally work rooms or store rooms. Consideration should be given to eventual removal of the equipment, particularly if more offices are needed.

2. SUMMARY OF DEFERRED MAINTENANCE WORK - SYRACUSE UNIVERSITY

PROJECT BUDGET

PROJECT TITLE MAXWELL HALL

PROJECT NUMBER 6198 DATE April 15, 1973

WORKSCOPE		HEALTH AND SAFETY	DEFERRED MAINTENANCE
1. GENERAL CONSTRUCTION			
a. Structure & Architectural Finishes		23,500.00	123,500.00
b. Heating, Ventilating, Air Conditioning		15,100.00	0.00
c. Plumbing		75,300.00	0.00
d. Electrical		12,750.00	6,600.00
e. Fixed Equipment			
f. Other			
g. Other			
2. SITE IMPROVEMENTS		NOT INCLUDED	IN THIS CONTRACT
a. Sitework			
b. Utility Services			
c. Landscaping			
d. Finish grading, walks, roads			
e. Lighting			
3. FEES AND SERVICES			
a. Space & Facilities Systems	5%	6,332.00	6,505.00
b. Borings, surveys, etc.			
c. Testing and inspections			
d. Architect Reimbursable			
e. Additional Services			
f. Other			
4. PHYSICAL PLANT			
a. Temporary Services			
b. Other			
5. CONTINGENCY (on Items 1 - 4)	20%	26,596.00	27,321.00
6. FURNISHINGS & MOVABLE EQUIPMENT			
7. MISCELLANEOUS			
a. Moving & Relocation			
b. Overhead + Profit	25%	39,895.00	40,982.00
TOTAL		199,473.00	204,908.00
TOTAL PROJECT BUDGET		404,381.00	

MAXWELL HALL

HEALTH & SAFETY

GENERAL CONSTRUCTION

STRUCTURE & ARCHITECTURAL

1.	Repair/replace entrances/firedoors/hardware	6,100.00
2.	Update, enclosed, rated stairway w/doors/ smoke vents	9,500.00
3.	Block off openings around pipes/ducts through walls/floors	1,250.00
4.	Door signage	
	Remove paint from temperature activated devices	750.00
5.	Remove trash from under stairs, etc. (Housekeeping)	600.00
6.	Supply/install fire extinguishers	300.00
7.	Repair buckled/warped floors/treads	5,000.00

HEATING & VENTILATING

1.	Repair exhaust fans/belts/dampers/motors	1,000.00
2.	Repair supply fans/belts/dampers/motors/coils	3,000.00
3.	Repair temperature control for fans	1,300.00
4.	Repair/adjust temperature control for building radiation including pressure reducing valve	4,000.00
5.	Clean registers/grilles of dirt/debris	900.00
6.	Clean intake/exhaust louvers	500.00
7.	Code piping to latest standards	400.00
8.	Install hoods over exhaust fan outlet at roof	3,500.00
9.	Add heat to lower front entrance	500.00

PLUMBING

1.	Install sprinklers in Corridors/Storage/Mechanical rooms	75,000.00
2.	Code piping to latest standards	300.00

ELECTRICAL

1.	Provide emergency lighting/generator	2,000.00
2.	Provide fire alarm/detectors	10,000.00
3.	Replace/repair/relocate exit lights	750.00

DEFERRED MAINTENANCE

GENERAL CONSTRUCTION

STRUCTURE & ARCHITECTURAL

1.	Repair roofs/eaves/cornices	9,800.00
2.	Repair/replace roofing	500.00

MAXWELL HALL

3.	Remove vines/point exterior/repair windows	52,900.00
4.	Repair/refinish interior doors	12,000.00
5.	Remove temporary non-bearing partitions Repair/restore interior walls	4,500.00
6.	Repair/level/refinish floors	19,000.00
7.	Repair/paint ceilings/walls	22,500.00
8.	Repair elevator	2,300.00

HEATING & VENTILATING

No items here

PLUMBING

No items here

ELECTRICAL

Repair/replace light fixtures/switches	1,500.00
Provide new clock system	3,500.00
Repairs to elevator key to button controls	1,600.00

3. UNIVERSITY OF NEBRASKA AT OMAHA
DEFERRED REPAIR AND MAINTENANCE REQUIREMENTS

The estimated 1976 costs for deferred maintenance requirements listed in this TAB represent the expenditure necessary to bring the respective buildings into a satisfactory status of repair. The purpose of surveying buildings and determining the cost of deferred maintenance was to establish the status of buildings and propose adoption of formula maintenance funding. One of the conditions before establishing a formula approach to maintenance budgeting is that buildings are in a satisfactory state of repair. Only after buildings are in a satisfactory state of repair can formula maintenance budgeting provide sufficient funds to maintain the buildings in good working order without occurring deferred maintenance requirements.

This listing of maintenance requirements should be accomplished as soon as possible in conjunction with the adoption of a formula approach to maintenance funding. Once deferred maintenance is completed, the University of Nebraska Maintenance Formula would provide sufficient funds to establish continuous preventive maintenance programs that should promote efficiency and economy, retard deterioration and insure longer life.

The total estimated repair and maintenance for Omaha is $1,780,878. Attached is a summary of deferred maintenance and repair cost followed by an itemized listing of repair and maintenance requirements for each building.

UNIVERSITY OF NEBRASKA AT OMAHA
SUMMARY OF DEFERRED REPAIR AND MAINTENANCE REQUIREMENTS

BUILDING	ESTIMATED 1976 COSTS	PAGE	BUILDING	ESTIMATED 1976 COSTS	PAGE
Administration	520,292	1	Annex 11	8,676	24
Kayser Hall	37,290	2	Annex 12	3,630	25
Business Administration	5,940	3	Annex 13	2,475	26
Eppley	54,065	4	Annex 14	2,783	27
Milo Bail Center	122,100	5	Annex 15	17,600	28
Performing Arts	40,700	6	Annex 16	8,800	29
Allwine	74,140	7	Annex 17	6,572	30
Engineering	106,801	8	Annex 19	8,085	31
Fieldhouse	229,663	9	Annex 20	19,222	32
Central Utilities	25,300	10	Annex 21	26,125	33
Library	--		Annex 22	7,205	34
Stadium	167,200	11	Annex 23	1,072	35
Urban Education	38,720	12	Annex 24	11,258	36
Sculpture Studio	5,500	13	Annex 25	3,850	37
Annex 1	2,518	14	Annex 27	8,407	38
Annex 2	2,510	15	Annex 30	10,175	39
Annex 3	1,440	16	Annex 31	670	40
Annex 4	1,628	17	Annex 32	10,274	41
Annex 5	1,408	18	Annex 33	220	42
Annex 6	1,580	19	Annex 34	14,135	43
Annex 7	1,700	20	Annex 35	7,205	44
Annex 8	1,501	21	Allwine Farm	1,100	45
Annex 9	1,700	22	Campus	156,106	46
Annex 10	1,537	23	TOTAL	$1,780,878	

REPAIR PROJECTS

	Building: KAYSER HALL	Floor Area: 57,045 sq. ft.	Dollars 1976 Est.
1. CONCRETE			
2. GLASS			
3. CAULKING			
4. ACOUSTICAL			
5. FLOOR COVERING	Repair 100 sq. yds. @$10/sq. yds.		$ 1,000
6. CEILING TILE	Repair 1,500 sq. ft. @$1.00/ sq. ft.		1,500
7. PAINTING	Repaint 51,142 sq. ft. @35¢/sq. ft.		17,900
8. METAL-IRON SPECIALTY			
9. WATERPROOFING			
10. MASONRY			
11. SHEET METAL			
12. MECHANICAL	Boiler Room Maintenance-$3,500		3,500*
13. PLUMBING			
14. INSULATION			
15. ELECTRICAL			
16. FIRE PROTECTION	Panic Hardware-$5,000		5,000*
17. SAFETY			
18. EMERGENCY SYSTEM			
19. MASONRY REPAIRS			
20. GROUNDS WORK	Sprinkler System-$3,500; Tree-$1,500		5,000
21. LIGHTING			
22. ELEVATORS			
23. ROOFING			
24. CARPENTRY			
25. ADDITIONAL FACILITIES			
		Subtotal	$33,900
		10% Contingency	3,390
		TOTAL	$37,290

*Immediate

REPAIR PROJECTS

	Building: ADMINISTRATION	Floor Area: 139,637 sq. ft.	Dollars 1976 Est
1. CONCRETE	Repair stairs & walk		$75,000*
2. GLASS	Repair windows		80,000
3. CAULKING	Cap Stone & Parapets		5,000*
4. ACOUSTICAL	Repair ceiling	500 sq. ft. @$1.00/ sq. ft.	500
5. FLOOR COVERING	Repair Stair Treads-$4,000 Floor Tile-$1,600	1,600 sq. ft. @$1.00/ sq. ft.	
6. CEILING TILE			
7. PAINTING	Exterior-$1,000	171,428 sq. ft. @35¢/sq. ft.	61,000
8. METAL-IRON SPECIALTY			
9. WATERPROOFING			
10. MASONRY	Tuck Pointing & Clean sandstone		5,000*
11. SHEET METAL			
12. MECHANICAL	Ductwork-$385; Boiler Room-$3,500; Steam Traps-$1,500		5,385
13. PLUMBING	Repair sloan valves-$2,520; Repair urinals-$4,200		6,720
14. INSULATION	Sound proofing $5,295 + $15,000 + $2,184		22,808
15. ELECTRICAL	Bury service to annexes-$5,200 Repair wiring-$20,000		25,200
16. FIRE PROTECTION	Fire Code-$43,000 Panic hardware & detectors-$700 + $2,070		56,590
17. SAFETY			
18. EMERGENCY SYSTEM			
19. MASONRY REPAIRS			
20. GROUNDS WORK	Sprinkler System-$10,000 Trees-$3,000		13,000
21. LIGHTING	Repair existing lighting-$2,375		2,375
22. ELEVATORS			
23. ROOFING	Repair membrane roof & gutter		77,000
24. CARPENTRY	Door maintenance-$2,915; Locks-$9,000 Repair cupola-$20,000		31,915
25. ADDITIONAL FACILITIES			
		Subtotal	$472,993
		10% Contingency	47,299
		TOTAL	$520,292

*Immediate

APPENDIX C

THE EFFECTS OF DEFERRING

Regardless of the reasons the effects of deferred maintenance are the same. The facilities decay to a point where major expenditures are required to allow continued use. The alternate choice is to abandon the facility.

Usually the deferred maintenance costs are just one of several expenditures included in the earlier slide on facility modification cost. One analytical approach that is often used to determine whether a facility should be renovated or replaced is as follows:

Equation #1 IF $RC < 65\%$ NC and if

Equation #2 $\frac{RC}{IALR} < \frac{NC}{LN}$ then

rehabilitation is feasible.

Where:

RC = renovation costs
NC = new construction costs
IA = adequacy index (values 0 to 1)
LR = life of renovated facility
LN = life of new facility

Experience indicates that deferral of maintenance results in an escalation of the original cost at an exponential rate. This condition is illustrated in Figure #5.

Deferral continues, problems will develop which impact on the usefulness of the facility.

If deferral lasts sufficiently long the total costs will exceed by a considerable amount the cost of the required maintenance level.

Unfortunately, deferred maintenance will usually get attention when it starts to interfere with the agency's activities. At this point funds are usually found to make the needed repairs, but unfortunately, at the expense of some other maintenance item. As long as the problem is not obvious or creating problems, justification can be extremely difficult.

DEFERRED MAINTENANCE COSTS

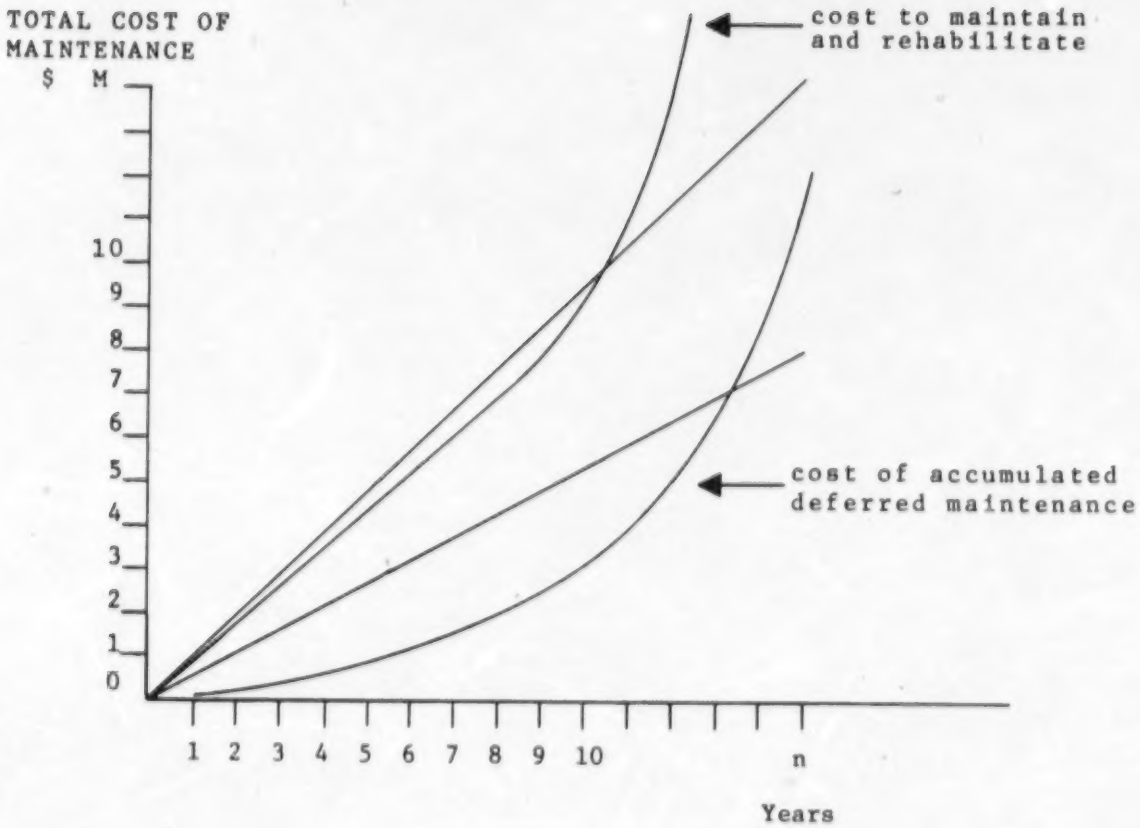
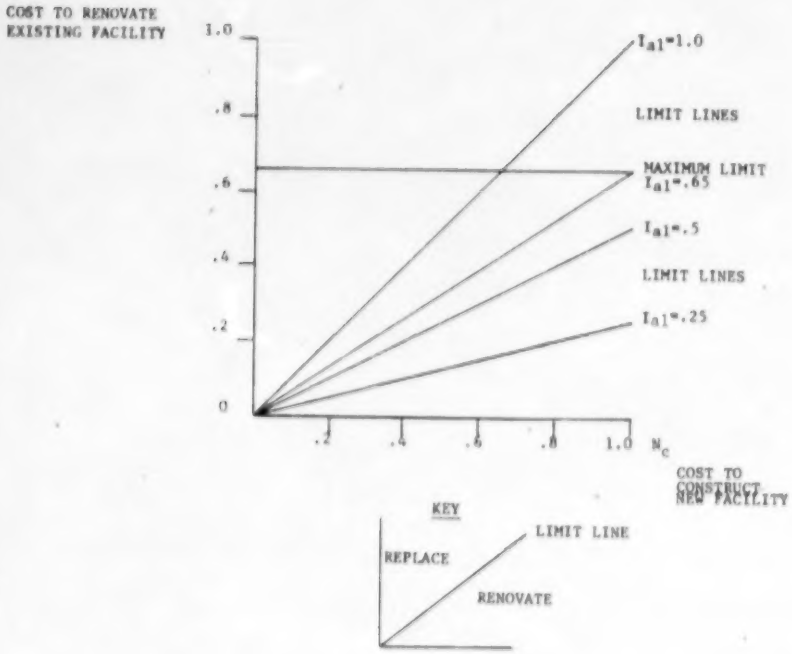


Figure #5

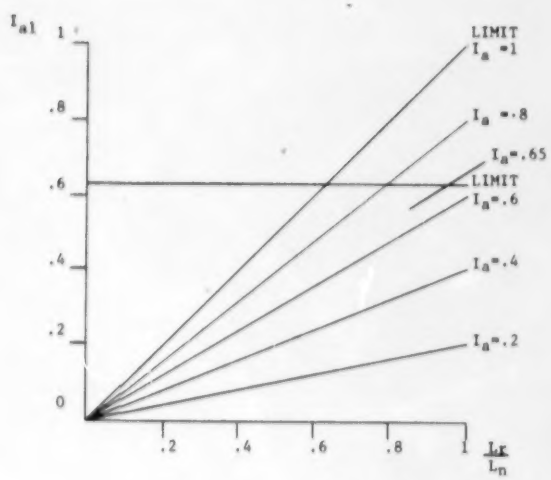
FACILITY ANALYSIS OF
RENOVATION FACTORS

$R_c \quad I_{al} \quad N_c$

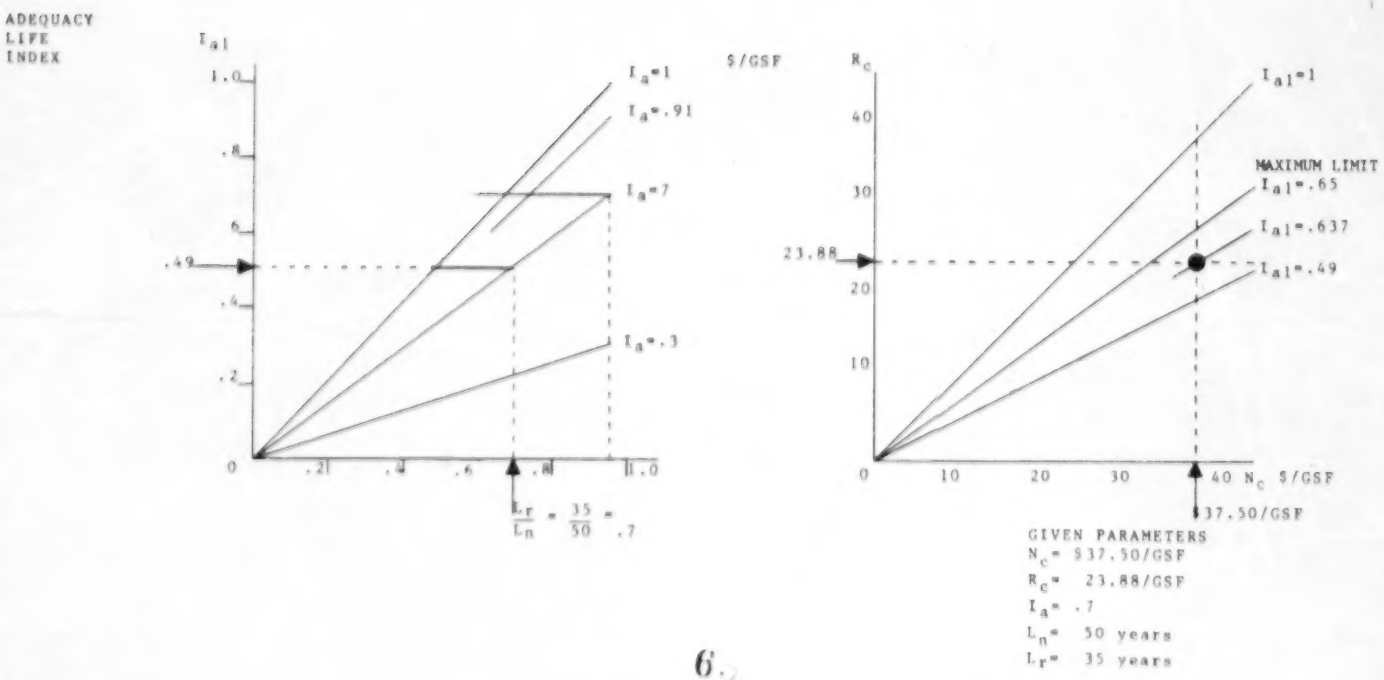


FACILITY ANALYSIS OF
RENOVATION FACTORS

$I_{al} = I_a \; L_r / L_n$



ANNE ARUNDEL HALL
RENOVATION ANALYSIS



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